Claim 1. An improved disk centrifuge capable of measuring scattered light at a plurality of angles from a sample undergoing separation therein comprising

a) a cylindrically symmetric chamber impressed to rotate about an axis of rotation through its generator, said chamber incorporating a cylindrical fluid-bearing cavity means within circular wall means of said chamber, said cavity extending over a range of radial distances from said axis of rotation, and said walls incorporating region transparent to light over a range of radial distances;

b) sample introduction means whereby said sample may be introduced into said cylindrical fluid-bearing cavity between said circular wall means, so that said sample undergoes separation by resultant centrifugal forces as said cylindrical chamber undergoes impressed rotation about said axis of rotation;

c) a flat transparent cylindrically symmetric optical region of one of said wall means;

d) a stationary external light source means providing a fine beam of light passing successively through said transparent region and said sample undergoing separation;

e) a stationary forward transmitted light beam trapping means into which said fine beam of light enters after leaving said transparent region;

f) a plurality of stationary detector means arranged about said light beam at varying angles therefrom, each said detector means masked by collimating means to accept only light scattered by said sample means from region of said sample illuminated by said incident light beam and passing through said transparent region; and

g) electronic means to convert signals from said scattered light detectors successively in time, converting said signals into digital representations, and transmitting said resultant digital signals to computer means for subsequent processing and analysis.

Claim **2**. An improved disk centrifuge capable of measuring scattered light at a plurality of angles from a sample undergoing separation therein comprising

a) a cylindrical structure impressed to rotate about an axis of rotation through its generator, said cylindrical structure containing cavity means to incorporate transparent cuvettes, said cuvettes

i. containing samples, each said sample undergoing separation by resultant centrifugal forces as said cylindrical structure undergoes impressed rotation about said axis of rotation;

ii. having a plane transparent optical surface through which an incident light beam may pass and an opposite plane transparent optical surface to provide a structure with said sample between said two surfaces; and

iii. oriented radially so that said resultant centrifugal force separates particles in a radial direction.

b) a stationary external light source means providing said fine beam of light passing successively through transparent regions of said optical surfaces of said sample containing cuvette;

c) a stationary forward transmitted light beam trapping means into which said fine beam of light enters after leaving normally from said transparent cuvette;

d) a plurality of stationary detector means arranged about said light beam at varying angles therefrom, each said detector means masked by collimating means to accept only light scattered by said sample means from region of said sample-containing cuvette illuminated by said incident light beam and passing through said optical surface means; and

e) electronic means to convert signals from said scattered light detectors successively in time, converting said signals into digital representations, and transmitting said resultant digital signals to computer means for subsequent processing and analysis.

Claim **3**. An improved analytical ultracentrifuge capable of measuring scattered light at a plurality of angles from a sample undergoing separation therein comprising

a) a cylindrical structure impressed to rotate about an axis of rotation through its generator, said cylindrical structure containing cavity means to incorporate transparent cuvettes, said cuvettes

i. containing samples, each said sample undergoing separation by resultant centrifugal forces as said cylindrical structure undergoes impressed rotation about said axis of rotation;

ii. having a plane transparent optical surface through which an incident light beam may pass and an opposite plane transparent

optical surface to provide a structure with said sample contained between said two surfaces; and

iii. oriented radially so that said resultant centrifugal force separates particles in a radial direction.

b) a first light source means directed normal to said rotating cylindrical structure providing said fine beam of light passing successively through transparent regions of said optical surfaces of said sample containing cuvette;

c) a forward transmitted light beam trapping means into which said fine beam of light enters after leaving normally from said transparent cuvette;

d) a plurality of light scattering detector means arranged about said light beam at varying angles therefrom, each said light scattering detector means masked by collimating means to accept only light scattered by said sample means from region of said sample-containing cuvette illuminated by said incident light beam and passing through said plane optical surface means;

e) a second light source at the same radial distance from said axis of rotation as said first light source providing a second beam of light directed normal to said rotating cylindrical structure and passing through said cuvette when said cuvette has moved to a second angular position;

f) a second forward transmitted light beam trapping means into which said second fine beam of light enters after leaving normally from said transparent cuvette

g) a second plurality of light scattering detector means arranged about said second light beam at varying angles therefrom, each said light scattering detector means masked by collimating means to accept only light scattered by said sample means

from region of said sample-containing cuvette illuminated by said incident light beam and passing through said plane optical surface means;

h) a mechanical support means by which said two light beam sources, said two pluralities of light scattering detector means are fixed in space relative to said rotating cylindrical structure rotating therebetween, said mechanical structure permitting its movement in radial position only;

i) electronic means to convert signals from said two pluralities of scattered light detectors successively in time, converting said signals into digital representations, and transmitting said resultant digital signals to computer means for subsequent processing and analysis.

Claim **4**. The improved analytical ultracentrifuge of Claim **3** where each said forward transmitted light beam trapping means includes detection means to monitor intensity of said incident transmitted beam

Claim **5**. The improved analytical ultracentrifuge of Claim **3** where said first light source produces a light beam at a wavelength permitting measurement of said sample absorption by said detector monitoring means of said light beam transmitted through said sample means of Claim **4**.

Claim **6**. The improved analytical ultracentrifuge of Claim **3** where said second light source is a laser.

Claim **7**. The improved analytical ultracentrifuge of Claim **6** where said laser source is plane polarized in a plane parallel to the radius of said rotating structure holding said sample cuvettes.

Claim **8**. The improved analytical ultracentrifuge of Claim **3** wherein said cuvette optical surface through which said fine light beam passes after its passage through said sample is plane along that region of said cuvette to include a selected range of radial positions along said rotating structure that said fine light beam may travel.

Claim **9**. The cuvette of Claim **8** wherein all optical surfaces through which the incident beam and scattered light pass are coated with transparent optical materials to reduce scattering and reflections at all air interfaces.

Claim **10**. The improved analytical ultracentrifuge of Claim **3** where said plurality of light scattering detector means arranged about said light beam at varying angles therefrom lie in a plane perpendicular to said beam.

Claim **11**. The improved disk centrifuge of Claim **2** where said forward transmitted light beam trapping means includes detection means to monitor intensity of said incident transmitted beam.

Claim **12**. The improved disk centrifuge of Claim **3** wherein said cuvette optical surface through which said fine light beam passes after its passage through said sample is plane along the length of said cuvette to include a selected range of radial positions.

Claim **13**. The cuvette of Claim **12** wherein all optical surfaces through which the incident beam and scattered light pass are coated with transparent optical materials to reduce scattering and reflections at all air interfaces.

Claim **14**. The improved disk centrifuge of Claim **2** where said plurality of light scattering detector means arranged about said light beam at varying angles therefrom lie in a plane perpendicular to said beam.

Claim **15**. The improved disk centrifuge of Claim **1** where said forward transmitted light beam trapping means includes detection means to monitor intensity of said incident transmitted beam.

Claim **16**. The improved disk centrifuge of Claim **1** wherein all optical surfaces through which the incident beam and scattered light pass are coated with transparent optical materials to reduce scattering and reflections at all air interfaces.

Claim **17**. The improved disk centrifuge of Claim **1** where said plurality of light scattering detector means arranged about said light beam at varying angles therefrom lie in a plane perpendicular to said beam.

Claim **18**. A method for measuring the molecular mass of molecules being separated in an improved analytical ultracentrifuge means incorporating two light sources comprising the steps of

a) deriving the concentration of said sample at the instant and radial location at which said sample is illuminated by the conventional light beam of said analytical ultracentrifuge by measuring the attenuation of said beam by said sample;

b) measuring the light scattered by said same sample at the instant and radial location at which said sample is illuminated by a second light beam, said scattered light detected over a range of scattering angles by means of a set of scattered light detectors placed in fixed proximity to rotating cylindrical structure of said ultracentrifuge;

c) combining said concentration and scattered light data to derive said molecular mass.

Claim **19**. The method of Claim **18** where said conventional light beam source and said second light beam source produce light beams that are co-linear.

Claim **20**. The method of Claim **18** where said conventional light beam source and said second light beam source produce light beams that are at identical radial distances from the axis of rotation of said improved analytical ultracentrifuge, but at different angular positions.

Claim **21**. The method of Claim **18** where said conventional light beam source produces UV light and said second light beam source produces light of a different wavelength.

Claim **22**. The method of Claim **18** where said second light beam source is a laser.